4037.	Brephos infans	April 15th.
4043.	Callizzia amorata	Aug. 8th.

The following Geometers are new to the British Columbia List:—

Eupethecia mutata, Pearsall	July 18th.
Dysstroma citrata var. suspectata	Aug. 12th.
Dysstroma citrata var. punctum notata	Aug. 20th.
Hydriomena autumnalis var. crockeri, Swett	May 4th.
Hydriomena speciosata var. taylori, Swett	July 3rd.
Hydriomena edenata, Swett	April 5th.
Hydriomena irata, Swett	May 7th.
Petrophora defensaria var. amorata	Sept. 24th.

REPORT FROM THE OKANAGAN DISTRICT: INSECT PESTS OF THE YEAR IN THE OKANAGAN.

By W. H. Brittain, Provincial Entomologist for Nova Scotia (formerly of British Columbia).

The summer of 1913 was not marked by any insect outbreaks of unusual severity. Most of the usual pests were present in greater or less numbers, while several interesting records were made for the first time. The following are some of the most important pests to receive attention during the year:—

Bud-worm (*Tmetocera ocellana*).

This insect was found working in several orchards in the Kelowna District, though not in sufficient numbers to do a great deal of damage. Three distinct species of moths were reared from larvæ resembling those of the true bud-moth (*Tmetocera ocellana*). This is interesting in view of the fact that the twig-boring habits of the bud-moth, which have been repeatedly observed in British Columbia, do not appear to have been noted elsewhere. It is possible that one of these other species is responsible for this work.

The Antique Tussock-moth (*Orgyia antiqua*).

The larvæ of this insect were unusually numerous in the orchards this season, but it is of only minor importance as a fruit pest.

Climbing Cutworms (Noctuidæ).

These insects, of which we had nearly a plague last year, could hardly be found at all this season. As we had no facilities for rearing these insects last season and they occurred in such small numbers in the spring of the present year, we do not know of what particular species they belonged.

Tent-caterpillars (*Malacosoma spp.*).

These insects appeared in large numbers in the spring, but were practically wiped out before reaching maturity by their parasites and by a bacterial disease with which they were attacked. From the large number of larvæ we collected for rearing no adult moths emerged.

Codling-moth (*Cydia pomonella*).

There was no further outbreak of this insect in the Armstrong District this year, the measures taken for its eradication having apparently proved successful. An outbreak occurred at Kelowna, however, though not in the same orchards as last year.

Lesser Apple-worm (*Enarmonia prunivora*).

This insect was unusually abundant throughout the orchards of the Okanagan this season, and many specimens reached the office from the different districts. From the letters that we have received, it would seem that this insect is on the increase. From its general resemblance in habits, life-history, and appearance to the codling-moth, it is frequently mistaken for this more serious pest.

In going over a large number of apples attacked by this insect we found that about 60 per cent. entered by the side of the apple. Here the greater number made shallow borings just below the skin, the larva, in most cases, being visible from the outside. Some few bored right to the core and fed around it, somewhat after the manner of the codling-moth; others, again, bored aimlessly throughout the pulp in all directions. About 25 per cent. entered by way of the stem end of the apple and the remainder through the calyx end.

THE FALL WEB-WORM (*Hyphantria cunea*).

The ugly webs of this insect were very much in evidence throughout the country this summer. They were commonest on the apple and the wild cherry-trees.

RED-HUMPED APPLE-TREE CATERPILLAR (*Œdemasia concinna*).

Very abundant and doing considerable damage locally to the foliage of apple-trees.

YELLOW-NECKED APPLE-TREE CATERPILLAR (*Datana ministra*).

These insects were present in unusually large numbers. In some of the young orchards they were responsible for the almost entire defoliation of a large number of trees.

PEACH-TREE BORER (*Sanninoidea exitiosa*).

This insect is a serious enemy of the peach in the southern Okanagan. A male and a female moth were reared this season from pupæ collected and sent me by Mr. W. H. Lyne. The male emerged on July 30th and the female on August 4th.

That we have the Eastern species in British Columbia is interesting, as elsewhere in the North-west a related species, *Sanninoidea opalescens*, is the common form.

THE IMPORTED CURRANT-BORER (*Ægeria tipulformis*).

This insect was present and doing noticeable damage in a few places.

PLUM AND APPLE SPHINX (*Sphinx drupiferarum*).

This large caterpillar will often strip all the leaves from a young tree in a very short time. They are very subject to the attacks of parasites, and for this reason never become numerous enough to do widespread damage.

CICADA (*Platypedia putnami?*).

These insects appeared in large numbers this year and were responsible for a certain amount of damage to the apple-trees by ovipositing in the twigs.

CHERRY-TREE TORTRIX (*Archips cerasivorana*).

A very common insect on the choke-cherries, but also found occasionally feeding on the leaves of apple-trees.

FRUIT-TREE LEAF-ROLLER (*Archips argyrospila*).

This insect was present in fairly large numbers throughout the Okanagan during the past summer. They feed upon the foliage of the apple, first bending over the leaves and tying them together with silk. They also feed upon the blossoms, but their worst injury is done to the young fruit. This they tie up as they do the foliage and eat small cavities in the sides. Considerable loss was occasioned in some places by this work.

OYSTER-SHELL SCALE (*Lepidosaphes ulmi*).

This insect is rarely injurious in young or in well-cared-for orchards in the Okanagan. In old neglected orchards, however, it is frequently the cause of considerable loss. Not only is it of importance as attacking the twigs and limbs, but not uncommonly the young scales find their way to the fruit and there form their scale. Some bad cases of this were noticed this season.

European Scale (*Aspidiotus ostreæformis*).

Specimens of this insect were received from Penticton and from Kelowna. Up to the present time it has not occurred in injurious numbers.

Apple-leaf Hopper (*Empoasca mali*).

The egg-blisters of this insect were abundant everywhere this spring in the new growth of the apple. Most commonly they were found in one-year-old wood, occasionally in two-year-old wood, and rarely in three-year-old. One or two eggs are found in each egg-blister. In examining a large number of these eggs this spring it was found that about 20 per cent. were parasitized by a small hymenopteran, which could readily be observed fully formed within the egg. The young hoppers began to emerge in the laboratory on May 9th, and a week later were practically all out.

Two distinct broods of this insect occur in the Okanagan. Leaves attacked by the leaf-hoppers rarely become curled in this district, as has been described elsewhere, but such leaves are mottled over with whitish or yellowish spots. On the fruit the injury shows as small, white circular marks about ⅛ inch diameter.

Tarnished Plant-bug (*Lygus pratensis*).

This insect was noted attacking a wide range of crops, but probably the most damage was done to nursery stock. Leaves that are attacked when young become wrinkled and curled. Sometimes small areas of the leaves become brown and die, subsequently dropping out and producing a "shot-hole" effect. Blossom-buds attacked are retarded in development, if not killed. Leaf-buds, when pierced at the base, frequently die and drop off.

Green Apple-aphis (*Aphis pomi*).

This insect, which is the most widespread and destructive of our apple-insects, was considerably less numerous than last year in most sections. In fact, the loss resulting from its attacks in the Okanagan was this year very slight.

Rosy Aphis (*Aphis sorbi*).

This insect was found for the first time this season in the Okanagan. Specimens were taken both at Vernon and Kelowna. It has not gained a very firm foothold in either district as yet, but may be expected to cause trouble in the future.

The Woolly Apple-aphis (*Eriosoma lanigera; americana?*).

This insect seems to be upon the increase and to be growing in importance as a fruit pest. Very few young orchards are badly infested, but a number of the older, more or less neglected ones have suffered severely. The root form of this insect is sometimes found in the Okanagan.

Elm-leaf Louse (*Eriosoma americana*).

The elm-leaves in the City of Vernon this summer were badly attacked by this insect. In some cases it caused partial defoliation of the trees.

The Currant-aphis (*Myzus ribis*).

This insect was very common on the currants everywhere.

The Black Cherry-aphis (*Myzus cerasi*).

This aphis was fairly abundant in most sections. It is the most important insect of the cherry.

Mealy Plum-aphis (*Myloptcrus arundinis*).

A common insect pest of the plum.

Cabbage-aphis (*Aphis brassicæ*).

Common and injurious to cabbages and turnips.

Fruit-leaf Beetle (*Syneta albida*).

A number of specimens of this beetle were sent in from Rand, B.C., where they were reported to be doing damage to strawberries and clover. In Oregon this insect is reported to cause serious damage to the foliage of fruit-trees, and no satisfactory control measures have so far been found.

Flea-beetles (*Epitrix subcrinita*).

These insects appeared in large numbers this year, and in some sections did a great deal of injury to tomato plantations. Potato-fields were in like manner attacked and damaged by the insects, which also fed freely upon the lamb's-quarters and other weeds about the fields.

Bronze Apple-borer (*Magdalis ænescens*).

This insect is very commonly found boring into the injured wood of apple-trees. Though I have not seen this insect enter an absolutely sound tree, it may sometimes be found boring from diseased wood into the healthy tissue.

Click-beetles (Elateridæ).

Though practically nothing has been written on the leaf-eating habits of these insects, they every year do considerable damage in the Okanagan by feeding upon the buds and tender foliage of apple-trees. Like the climbing cutworms, these insects prefer young trees, one-, two-, and three-year-old trees being injured worst. As no satisfactory remedy is at present in vogue, a knowledge of the life-history and early habits of these insects is very desirable.

The most common and injurious species is *Corymbites inflatus*. This spring I found a very severe infestation at Short's Point of *Cardiophorus fenestratus*.

Other species taken from orchards in the Okanagan are: *Corymbites morulus*, *C. fallax*, *C. maurus*, *C. furtivus*, *C. conjungens*, *C. aeripennis*, *C. cruciata*, *C. triundulatus*, *Cardiophorus tenebrosus*, *Elater nigrinus*, *Dolopius lateralis*, *Limonius pilosus* (*infuscatus*), *L. discoideus*, *L. venablesi*, *L. canus*, *Cardiophorus tumidicollis*.

Grey Leaf-beetle (*Glyptoscelis pubescens?*).

This insect is present in abundance in the spring, feeding mainly upon *Balsamorrhiza sagittata*, but it occasionally attacks apple-foliage.

Currant Fruit-fly (*Epochra canadensis*).

Considerable damage was done to the currants this season by this pest.

Raspberry-cane Maggot (*Phorbia rubivora*).

Though I have never taken this insect in the Okanagan, numbers of specimens have been sent in from other sections of the Province.

Onion-maggot (*Pegomyia ceparum*).

Fairly common in gardens about Vernon.

The Hyacinth-mite (*Rhizoglyphus hyacinthi*).

This spring my attention was called to an onion plantation at Vernon where a large proportion of the young onions were withering and dying away. On examining the roots and young bulbs, they were found to be covered by these mites, which in many cases had burrowed right into the root. If these mites ever become widely injurious, control will be rendered difficult by the fact that they have no respiratory system.

The Red Spider (*Tetranychus bimaculatus*) and the Brown Mite (*Bryobia pratensis*).

Both these mites were common in the Okanagan this year, but the former was present in much larger numbers and responsible for more damage.

Pear-leaf Blister-mite (*Eriophyes pyri*).

In a few isolated cases found this mite severely injuring pears. Have never found it attacking apple-trees in British Columbia.

The "Rusty-leaf" Mite (*Phyllocoptes schlectendali*, Nalepa).

This species is widely distributed all over the northern United States and probably Canada. It has been recorded from Oregon by Prof. P. J. O'Gara.

This mite feeds upon the upper surface of the apple-leaves. The symptoms exhibited by foliage so attacked varies greatly. In some cases the leaves present a red, rusty appearance which gives the mite its popular name. More often, however, at least in the Vernon District, the leaves have a decided silvery appearance. On this account, the work of this pest is almost invariably confused with the disease called "silver-leaf."

The two troubles differ from each other, however, in several important particulars. In the case of the silver-leaf the entire leaf is uniformly silvered, while in that of the mite-work it is usually more or less patchy. When a leaf attacked by the mite is examined with a lens, small islands of normal green tissue can be detected among the rest. The leaves of trees attacked by the true silver-leaf are characterized by a soft milky gloss, while those attacked by the mites have usually a decided metallic lustre.

The prevalence of these two troubles, so similar in appearance, has caused a great deal of confusion in the minds of fruit-growers and others, and something should be done to distribute in the fruit sections accurate information of how to distinguish between them.

Several other species of mites produce a silvery appearance upon the leaves of the trees which they attack. A very bad attack of the common red spider (*Tetranychus bimaculatus*) frequently produces this effect on plum-leaves. Elm-leaves attacked by mites also frequently exhibit a decided silvery sheen.

The "Apple-scab" Mite (*Eriophyes malifoliæ?*).

The work of this mite is very abundant in the Vernon District on apple-foliage, and is almost invariably mistaken for apple-scab. The presence of the mites was first pointed out to me by Mr. H. T. Güssow, Dominion Botanist, and the species was determined by Dr. Nathan Banks as probably *Eriophyes malifoliæ*.

The work of mites is characterized by brownish or black areas upon the leaf, convex on the upper side, concave on the lower. The mites themselves are found on the under-side, concealed by the pubescence of the leaf. When the mites are present in large numbers the entire leaf may be withered and brown.

The Garden Millipede (*Julus hortensis*).

Though injury from millipedes is not common, reports of damage done, particularly to vegetables in gardens, are received from time to time. The remedy is to soak slices of turnip, carrot, etc., in lead-arsenate solution, 2 lb. of the paste form in a gallon of water, and to distribute this poisoned bait around the infested portion of the field.

I append a list of captures for the Okanagan, mainly Coleoptera:—

COLEOPTERA.

Arodns crenatus, Lay.	B.C.
Eleodes pimelioides, Mann.	
Epicauta maculata, Fab.	Swan Lake, B.C.
Eleodes obscura, Mann.	Larkin, B.C.
Corymbites inflatus	Penticton, B.C.
Trogositus virescens, Fal. (eating-apple)	Larkin, B.C.
Corymbites hieroglyphicus, Lay.	B.C.
Alares melanops, Lec.	Larkin, B.C.

Blyphylla decemlineate, Lay. ....Swan Lake, B.C.
Prionus californicus ....Swan Lake, B.C.
Pachyta spurea, Lec. (July, 1912) ....Swan Lake, B.C.
Acanthocinus obliquus, Lec. ....Swan Lake, B.C.
Clytus planifrous, Lec. ....Larkin, B.C.
Xylotrechus undulatus, Lay. ....Larkin, B.C.
D. valens ....Swan Lake, B.C.
Liptura canadenses, Fab. ....Swan Lake, B.C.
Tetropium velutinum, Lec. (on fir, June 1st, 1912) Coldstream, B.C.
Ascnum atrum, Esch (June 20th, 1912) ....Larkin, B.C.
Monohammus scutellatus, Lay. ....Larkin, B.C.
Clerus sphegerus, Fab. ....Larkin, B.C.
R. bicolor (on rose, June 1st, 1912) ....Coldstream, B.C.
Cicindela vulgaris var. obliqua, Kirby.
Cicindela 6-guttata, Fab.
Carabus taedatus near var. agassii, Lec.
Platynus bogemanni.
Adoxus obscurus var. vitis, Linn.
Haltica bimarginata, Say.
Luperodes varipes, Say
Temnochila chloroida, Mann.
Hydrophilus triangularis, Say.
Cucujus clavipes var. puniceus, Mann.
Hippodamia 5-signata, Kirby.
Hippodamia convergens, Guen.
Coccinella trifasciata, Linn.
Coccinella transversoguttata, Hab.
Coccinella 9-notata, Hbst.
Cycloneda sanguinea, Linn.
Eleodes hispilabris, Say.
Eleodes humeralis.
Coniontis ovalis, Lec.
Helops regulus, Blaisd.
Nemognatha dichroa, Lec.
Podabius tomentosus var. pruinosus, Mann.
Cremastochilus pilosicollis, Horn.
Epicauta puncticollis, Mann.
Phytonomus punctatus.
Nocholes torpidus, Lec.
Silpha ramosa, Say.
Dichelonyca vicina, Fall.
Lacnosterna trista, Fab.
Monohammus confusor.

Lepidoptera.

Sthenopis argenteomaculatus.

REPORT FROM VANCOUVER DISTRICT: INSECTS ECONOMICALLY IMPORTANT IN THE LOWER FRASER VALLEY.

By R. C. Treherne, Field Officer, Dominion Division of Entomology,
Experimental Farm, Agassiz.

The object I have in presenting this paper is to record, as best I am able, as a result of the past two seasons' observations, the various insects occurring in the Lower Fraser Valley which are of greater or lesser economic importance to the fruit-growers and farmers. I shall endeavour to describe, for the benefit of all, the